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**MEMORANDUM FOR: Executive Director-Comptroller**

**THROUGH : Deputy Director for Science and Technology**

**SUBJECT : Proposal for Mass Storage System in the  
Office of Computer Services**

1. In our meeting of 7 December 1972, we discussed OCS plans for a Mass Storage System. You then asked that I prepare a memorandum requesting approval in principle. This memorandum is in response to that request.

2. The System:

The proposed Mass Storage System is a collection of computer hardware and software to be connected to OCS computer systems for the purpose of storing and managing the large amounts of data which must be constantly moved in and out of our computers. We are planning to procure a Mass Storage System capable of storing one trillion bits of information. This is about three times the amount of data we currently have recorded on magnetic tapes and magnetic disks. The hardware technology is available today, but more development is necessary in order to put this hardware together with our computer systems and to write the software for controlling it. We have sent a request for proposal to eight manufacturers who can supply mass storage systems now.

3. The Need:

As the volume of work grows in OCS, more and more data is recorded on magnetic tapes and disks. These must be cataloged, stored in a library, and circulated to and from the computer systems as the demands for processing data occur. Some conception of the scale of these tasks can be gained from the following:

- There are 20,000 reels of tape in use and this is growing by some 3,000 reels per year.

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- There are 400 disk packs in use and this is growing by 50 per year.
- There are 40 tape units installed; an average of 12,000 tapes are placed on these units during a month.
- There are 132 Disk Drives installed; 176 will be needed by December 1973.
- There are 1,100 square feet of space in the library where tapes and disks are stored. The capacity of the library has nearly been reached.

A Mass Storage System is needed to provide a quick way of handling data so that most of the manual operations needed to handle disks and tapes can be gotten rid of. This will cut down human errors, significantly improve security, speed up access to data, reduce the need for more manpower to handle tapes and disks, lessen growing pressures for equipment space, improve the audit and accounting system for stored data, and generally improve productivity.

**4. Schedules:**

The necessary software can be developed and the first complement of hardware installed by the end of FY 74 to provide our time sharing computers with one hundred billion bits of mass storage (one tenth of the total proposed system). This hardware can then be expanded by increments to the full trillion bit capacity needed to handle the batch computer systems. This expansion will occur during FY 75 and FY 76, when the first installation has been proved successful. In these years we shall also begin getting rid of some tape units and disk drives so that a total reduction of \$2.2 million in projected tape and disk rentals will be saved through FY 78.

**5. Costs:**

Mass Storage System costs include letting a contract for the software to control the system and to mate it with OCS computers; the purchase of hardware for the first system comprised of a computer

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controller and a one hundred billion bits of storage; purchase of an additional computer controller (for backup); storage to expand to 1 trillion bits of storage; and annual maintenance contracts for purchased equipment. Until our bidders respond, cost estimates are tentative. We estimate, however, that for the period FY 73 to FY 76 these will be as shown below. Costs beyond FY 76 can be limited to equipment maintenance, approximately \$30,000 per year.

	Total	(Thousands of Dollars)			
		FY 73	FY 74	FY 75	FY 76
Software	800	100	600	100	---
Initial Hardware	700	600	100	---	---
Expanded Hardware	1,300	---	---	1,000	300
Maintenance	<u>60</u>	<u>---</u>	<u>10</u>	<u>20</u>	<u>30</u>
	2,860	700	710	1,120	330

**6. Funding:**

OCS plans to fund as much of this cost as can be provided from within presently programmed funds. FY 73 funds of \$700,000 are available. The availability of FY 74 funds will be dependent upon the as yet undetermined budget for that year. If the OCS budget is approved as submitted, funds can be programmed for this purpose.

**7. Alternatives:**

We can continue as now with the present tape and disk operation. The potential advantage to this is that the industry market for Mass Storage Systems may well result in the development of packaged systems during the next five years, thus eliminating some of the development effort in the proposed plan. On the other hand, this delay will increase the pressures on operating personnel, equipment, Computer Center space, security, and quality of service.

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Several large computer operations faced with similar problems, have started mass storage programs. None, however, propose to face the problem as we do.

**8. Risk:**

We judge there to be no risk in the hardware procurement. Proven hardware has already been delivered to the National Security Agency and the National Aeronautics and Space Agency. The software area is more fussy. We shall be embarking on a course of software development which is as yet unproven, especially with regard to the improvements we hope to get in security, management and universality of application to many varieties of hardware. Nevertheless, with the help of an independent contractor, we estimate that our goals are within reach.

**9. Coordination:**

The other computer centers at Headquarters, the Office of Research and Development, and Office of Security have been briefed on OCS plans for a Mass Storage System. While the Mass Storage System may be used by other computer centers, the requirement for the system is not based on this use.

10. The projection of a net increase in computer costs on the order of \$700,000 for the period FY 73 - FY 78 (\$2,920 - \$2,200) pays for a greatly improved system of handling data. I ask that you give your approval in principle to the plan for a Mass Storage System in OCS.

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**JOHN D. LAMS**  
Director of Computer Services

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